THE

ONTARIO WATER RESOURCES

COMMISSION

WATER POLLUTION SURVEY

of the

VILLAGE OF CLIFFORD

COUNTY OF WELLINGTON

1971

REPORT

ON A

WATER POLLUTION SURVEY

OF THE

VILLAGE OF CLIFFORD

COUNTY OF WELLINGTON

1971

DISTRICT ENGINEERS BRANCH

DIVISION OF SANITARY ENGINEERING

INDEX

INTRODUCTION

A water pollution survey was conducted in the Village of Clifford on June 10, 1971, for the purpose of updating the previous water pollution survey report of May 16, 1966 and to determine if the amount of sanitary wastes entering Red Creek via the storm sewer system serving the Village had changed since the previous survey. Such surveys are performed by the OWRC's Division of Sanitary Engineering as a basis for determining water supply and sewage treatment requirements.

At the time of the survey, the sky was sunny and the temperature was about 75 degrees F. No rain had been recorded in the area under investigation for the past several days.

I GENERAL INFORMATION

The Village of Clifford is located in the extreme northwest portion of Wellington County on Highway 9. Red Creek flows north-easterly through the Municipality and unites with Meux Creek, a tributary of the South Saugeen River approximately two miles north-east of the Village.

According to the 1971 Municipal Directory, the 1970 population of the village was 540 persons. Since the last survey of 1966 the population of Clifford decreased by 10 residents. A lack of industry within the Village and outlying area may account for the static growth conditions experienced within the Municipality over the past five years. In general, the economy of the Village is based on small retail outlets and services.

The only industry located in Clifford is the Bieman Milk Company which operates two small plants, one producing cream, the other powdered milk and cheese. A conversation with an employee of the powdered milk and cheese plant revealed that this operation, while still operating under the name of Bieman was actually owned by Teeswater Dairy. Further discussion revealed that the above operation would be discontinued in mid-July of this year and the building and land offered for sale or rent.

II WATER USES

Municipal Water System

Water is drawn from a 170 foot drilled well by a 5 stage centrifugal pump and distributed without treatment to approximately 540 consumers. A 197,000 gallon standpipe provides storage for the system. Neither a standby pump nor an auxiliary gasoline or diesel driven motor is provided at the pumphouse for emergency situations. The standby supply located at the Bieman Creamery was disconnected from the system several years ago.

The distribution system consists of 7000 feet of 6-inch diameter cast iron main, 5000 feet of 4-inch diameter cast iron mains and 5000 feet of 5/8-inch copper services. A flow meter was recently installed in the pumphouse.

Recreational Water Uses

During the survey, an outdoor swimming pool located in the south-east section of Clifford and adjacent to Red Creek was investigated. An inspection of the above facility revealed that the actual construction consisted solely of excavating an allotted area of land adjacent to the western bank of Red Creek and utilizing part of the cut for a berm. During the summer months water from the water works is constantly fed to the pool in an effort to maintain a water safe for recreational activities. The overflow from the pool is directed to Red Creek.

Red Creek is not used substantially for recreation due to its limited size. Thus boating, fishing and swimming are not practised to any degree.

Agricultural Uses

Red Creek originates in farmlands to the south of Clifford in Minto Township and flows in a north-westerly direction through farmlands upstream of the Municipality. Under these circumstances, it can be assumed that the water course is used for cattle watering.

III WATER POLLUTION

Domestic sewage disposal facilities consist of individual septic tanks and tile fields. The residential lots housing these septic tank systems appear to be of sufficient size to satisfactorily handle sanitary and kitchen wastes. However, in the closely built commercial area, sufficient space is not available for the installation

of suitable tile fields. The Municipality is served by 5 separate storm sewers which discharge to Red Creek. Effluent was being discharged from 3 of the storm sewers at the time of the survey and physical evidence indicated the presence of sanitary sewage in every instance.

The results of the laboratory analyses performed on the samples collected during the survey are presented in a later portion of this report along with a map of the storm sewer system and sampling locations.

Industrial Waste Disposal

The only source of industrial pollution originates at two small dairy plants, one produces cream and is owned and operated by the Bieman Milk Company, the other produces powdered milk and cheese and is owned and operated by Teeswater Dairy. Water is drawn from a 138 foot drilled well and pumped to both plants by a 100 Igpm pump. Although an estimate of water consumption could not be made, it is reported that about 70 per cent of the water is employed for cooling and processing whereas the remaining 30 per cent is used in wash-up operations.

Waste water from the cheese and powdered milk operation is being discharged via a municipal road drain to Red Creek. The results of the chemical and bacteriological samples obtained from the road drain indicated that a high level of waste material is gaining access to the watercourse.

Wastewater from the creamery is directed to a disposal field located several hundred feet behind the operation. A discussion with an employee of the creamery revealed that disposal of the dairy wastes by spray-irrigation is not practised as the majority of the liquid wastes either evaporates or filters into the ground. It was later learned that the disposal field is underdrained by a tile field which discharges to Red Creek. Two small outfalls, one flowing, one dry, located behind the creamery were investigated during the survey. The results of the chemical and bacteriological samples obtained from the flowing outfall did not reveal a significant level of dairy wastes in the effluent, however, the presence of a strong dairy odour permeating from the drain along with the formation of a white curd around the lip of the opening may indicate that dairy wastes from the creamery are periodically discharged via this outfall to the watercourse.

IV DISCUSSION

Table I, appended to this report, provides a summary of the results of the chemical analyses and bacteriological examination of the samples collected during the survey.

BOD, suspended solids, total phosphorus, organic nitrogen and coliform levels in the Queen, Clarke and Elora Street Storm sewers were sufficient to indicate the presence of domestic sewage. The inadequacy or absence of septic tank systems in the commercial area through which two of the three sewers pass was thus emphasized.

Results of the bscteriological examination and chemical analyses performed on the sample obtained from a road ditch which conveys the effluent from the powdered milk and cheese plant indicates that pollutants of substantial strength were gaining access to Red Creek. As previously discussed, the above operation will be discontinued in mid-July and therefore should not be considered a future threat to the impairment of the water quality of Red Creek.

Closer attention should be given to the disposal practices of the Bieman Creamery. As indicated in the previous report, the disposal field used by the creamery is underdrained by field tile and discharged to Red Creek. This method of disposal is considered unsatisfactory by the Commission and should be replaced by spray-irrigation to prohibit discharge to the Creek. The two drains located behind the creamery are reportedly used for the wasting of water utilized as a cooling agent in the creamery. However, physical evidence appeared to indicate that wash water containing dairy wastes was periodically being discharged to the watercourse.

Results of the examination performed on the bacteriological sample obtained from the outdoor pool overflow revealed the presence of coliform and faecal coliforms at levels within the recommended limit for bathing waters. However, as chlorination is not practised, bacteriological samples should be obtained on a regular basis during the period of operation and sent to the nearest Department of Health laboratory for examination. It is emphasized that the presence of faecal coliforms in bathing water poses a potential health hazard.

Table II, appended to this report provides a comparison of the results of the chemical analyses and bacteriological examinations of the same locations sampled during this survey and the previous survey of 1966.

As clearly indicated, the amount of domestic wastes entering Red Creek via the various storm sewers serving the Village has increased since the previous survey. Further evidence to this effect can be seen by a noticeable increase in the impairment of the water quality of Red Creek downstream of the Village.

PREVIOUS SURVEY ACTION TAKEN

Upon request by the Municipality, a meeting between the OWRC's Division of Sanitary Engineering and Council was held in November 1966 in order to discuss the various aspects involved in developing a sewage works program. At that time Council expressed a desire to initiate a project. The talks covered methods of financing a sewage works project and the type of treatment facility most suitable for a Municipality of Clifford's size. However, no steps have been taken since then to pursue the matter.

V CONCLUSIONS

In view of the following facts, immediate action should be taken by Council in the form of a meeting between itself and Commission staff in order to renew discussions concerning the implementation of a sewage works program or improvements to the existing private disposal systems.

1. The municipality has not contacted the local health unit regarding malfunctioning septic tank systems and installation of approved sanitary sewage disposal units in areas where they are required.

2. No improvements have been undertaken by the Bieman Creamery in regards to its present method of dairy waste disposal.

3. As indicated in Table II, a noticeable degradation in the water quality of Red Creek has taken place since the previous survey.

4. If a sewage works program is anticipated by the municipality, immediate action should be taken as the cost of financing such a project has substantially increased in the last five years.

VI SUMMARY

A water pollution survey was conducted in the Village of Clifford on June 10, 1971. The results of the survey indicate that domestic wastes from the Municipality are gaining access to the storm sewers. Results of the chemical analyses and bacteriological examinations performed on samples taken upstream and downstream of Clifford indicated a further degradation in the water quality of Red Creek since the previous 1966 survey. In addition, dairy wastes from the powdered milk and cheese plant were continuing to be a source of contamination to the creek. Inadequate disposal methods employed by the Bieman Creamery for disposal of their dairy wastes was also felt to be a contributing factor to the impairment of Red Creek's water quality.

VII RECOMMENDATIONS

1. It is recommended that the municipality contact the Wellington County Health Unit and request a survey for the purpose of correcting problems associated with malfunctioning septic tank systems and supervising the installation of the above systems in areas where sanitary wastes are gaining access to the storm sewers.

2. If the municipality cannot resolve the above problem on an individual basis, it is recommended that discussions should be immediately renewed with the OWRC's Division of Sanitary Engineering concerning the implementation of a sewage works program.

Wayne Merritt

W. B. Merritt,
Division of Sanitary Engineering.

APPENDIX I

DEFINITION OF TERMS

Coliforms per 100 ml.

Coliform bacteria are commonly found in the intestinal tract of man and animals and in the faecal discharges from these sources. In polluted water their concentration is roughly proportional to the degree of sewage contamination present. The objective for natural waters is a concentration is exceeded, it will become necessary to determine the cause and initiate corrective action.

Faecal Coliforms per 100 ml.

The faecal coliforms are coliform bacteria usually associsted only with the faecal discharges of man and other warm blooded animals and as such their presence indicates pollution from intestinal origin. When this coliform is present, it is assumed that water is potentially dangerous when consumed.

Biochemical Oxygen Demand

The Biochemical Oxygen Demand (BOD) is a measure of the amount of oxygen required for the stabilization of decomposable organic or chemical matter present in water. OWRC objectives allow concentrations in natural waters and waste discharges of not greater than 4.0 and 15.0 parts per million (ppm) respectively.

Solids

The solids content of a liquid is expressed as total suspended and dissolved solids. The suspended solids figure is the most important since it represents that portion which is carried down current and later deposited. The OWRC's objective for the

discharge of this material is a concentration less than 15.0 parts per million (ppm).

Total Kjeldahl

Total Kjeldahl is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The total Kjeldahl less the ammonia nitrogen measures the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. Total Kjeldahl in concentrations above the normal range of 0.1 - 0.5 parts per million indicate the presence of sewage in a stream.

Total Phosphorus

Phosphorus is an essential plant nutrient and is believed to play an important role in the deterioration of the quality of natural waterways by promoting an overabundance of plants.

APPENDIX II

IMPLEMENTATION OF WATER AND SEWAGE WORKS PROGRAMMES

Currently, there are three general methods which may be utilized for implementing sewage and water works programs. These are: 1) to enter into an agreement with the OWRC for the construction of the treatment and collector works with an obligation to pay the debt retirement and operating charges over the term of the agreement with the facility reverting to the municipality at the end of the term of the agreement, 2) by requesting the provision of service from a Provincially-owned project, and 3) by proceeding with the construction independently and meeting capital costs by the sale of debentures.

OWRC/MUNICIPAL PROJECTS

For the construction of water and sewage works under agreement with this Commission, the works are provided and developed under Sections 39 to 46 of the Ontario Water Resources Commission Act.

For this type of arrangement, the Commission utilizes a sinking fund and consequently the annual payments are based on a specific debt retirement period and the payments are unchanged for the period of the agreement. This type of project may be financed over a period of time up to a maximum of thirty years. The annual charges for projects constructed under this agreement are determined as follows:

1. Capital Repayment

As noted, OWRC financing is by the sinking fund method and an annual payment of approximately 2 per cent of the capital cost is required to retire a debt over a thirty-year period.

2. Interest

On new Commission projects, interest is calculated at the current rate.

3. Reserve Fund

To provide money for repairs and replacements, Section 40 of The Ontario Water Resources Commission Act provides for the establishment of a reserve fund by the Commission. It is important to note that this fund is established in the name of the municipality and the balance consequently earns interest. It has now been established by Commission minute that the reserve fund billing for each project shall continue only until the fund reaches an amount of ten times the initial annual billing and the reserve fund billing shall be re-imposed only when the fund has been depleted to 80 per cent or less of the maximum amount.

4. Operating Costs

Under OWRC agreement, the municipality is responsible only for the operating costs directly attributed to the project in the municipality. Therefore, no charges are made by the Commission for the services of head office personnel who are available as required to advise on the satisfactory operation and maintenance of the project.

PROVINCIALLY-OWNED WORKS

In June, 1967, the Honourable J. R. Simonett, Minister of Energy and Resources Management, made an announcement which expanded the authorization of this Commission for the provision of water supply and sewage treatment facilities. This new program allows the Commission to construct entire water and sewage works facilities for samll municipalities. The capital costs of these can be amortized over a 40 year period.

A slight variation of this program could be implemented in that the municipality may request that this Commission provide only the major water and sewage works facilities as Provincially-owned works, and develop the water distribution and sewage collector systems under the standard type of Commission project. It would appear that where applicable, it would be more advantageous for the municipality to proceed on the basis of requesting this Commission to develop entire systems as Provincially-owned works.

The associated cost of supplying these works, including amortization of capital costs, together with operating and maintenance charges, will be recovered by the sale of service to the affected municipalities by rates determined on a usage basis. These facilities will be wholly-owned by the Province of Ontario and the arrangements for service will be formalized by contracts between the Commission and the municipality concerned. The installations will be operated entirely at cost with appropriate provision for adjustment in rate.

DEVELOPMENT

If a municipality, after considering the alternatives, wishes this Commission to consider Provincially-financed projects, application forms should be completed and submitted together with a resolution of the Municipal council. A draft of the suggested wording of the resolution is included with the application forms.

If the proposed works are to be built by the municipality on its own initiative or as a formal project under agreement with this Commission, it is required that the Council retain a consulting engineer to prepare preliminary engineering reports on the proposed work. If a Provincial system is contemplated, no action should be taken with respect to retaining a consulting engineering firm as the Commission will designate a consulting engineer to carry out the Provincial portion of the work and it would be advantageous if the municipal portion be studied and reported on by the same engineer.

TABLE I

VILLAGE OF CLIFFORD

WATER POLLUTION SURVEY

SAMPLE RESULTS

Location	Number	5-Day BOD	Suspended Solids	Total Kjeldahl	Total Phosphorus	Total Coliforms Per 100ML	Faecal Coliforms Per 100 ML
Red Creek Upstream of Clifford	S-1	2.5ppm	5.0ppm	0.73ppm	0.033ppm	600	50
Rotary Club Pool Overflow	OF-1	2.0ppm	5.0ppm	0.20ppm	0.012ppm	140	10
Clarke St. Storm Sewer	O-1	24.0ppm	5.0ppm	-	-	302,000	52,000
Downstream of Elora Street Storm Sewers	S-2	2.5ppm	5.0ppm	0.85ppm	0.062ppm	7,100	470
William Street Storm Sewer	O-2	11.0ppm	5.0ppm	3.90ppm	1.100ppm	144,000	100
Private Outfall Behind Teeswater Powdered Milk and Cheese Plant	O-3	3.5ppm	5.0ppm	0.45ppm	0.091ppm	2,200	<10
Effluent Sample From Above Plant	O-4					310,000	4,500

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Location	Number	5-Day BOD	Suspended Solids	Total Kjeldahl	Total Phosphorus	Total Coliforms Per 100ML	Faecal Coliforms Per 100ML
Downstream of William Street Storm Sewer	S-3	2.5ppm	5.0ppm	0.83ppm	0.078ppm	2,500	180
Elora-Queen Street Storm Sewer	O-5	60.0ppm	15.0ppm	30.0ppm	4.9ppm	4,700,000	106,000
First Bridge Downstream of Clifford	S-5	6.0ppm	5.0ppm	2.5ppm	1.100ppm	1,100	10
Ditch (Hwy 9) Draining to Red Creek	D-1	12.0ppm	15.0ppm	6.5ppm	1.800ppm	-	-
Downstream of Bieman Creamery Outfalls	S-4	3.0ppm	5.0ppm	0.85ppm	0.084ppm	5,100	140
Flowing Outfall Behind Bieman Creamery	O-6	1.6ppm	5.0ppm	0.12ppm	0.017ppm	48	4

TABLE II

VILLAGE OF CLIFFORD

WATER POLLUTION SURVEY (COMPARISON OF SAMPLE RESULTS)

SAMPLE LOCATION	1966 SURVEY			1971 SURVEY		
	5-Day BOD	Suspended Solids	Total Coliforms Per 100 ML	5-Day BOD	Suspended Solids	Total Colifori Per 100 ML
Red Creek Upstream of Clifford	0.4ppm	1.0ppm	260	2.5ppm	5.0ppm	600
Clarke Street Storm Sewer	3.8ppm	5.0ppm	710,000	24.0ppm	5.0ppm	302,000
William Street Storm Sewer	0.8ppm	8.0ppm	75,000	11.0ppm	5.0ppm	144,000
Drain From Teeswater Powdered Milk And Cheese Plant	48.0ppm	32.0ppm	60,000			310,000
Red Creek At First Bridge Downstream of Clifford	0.8ppm	11.0ppm	570	6.0ppm	5.0ppm	1,100

N

MINTO TWP

HOWICK TWP

TO JUNCTION WITH THE RED RIVER

D-1

STREET

JAMES STREET

O-9

QUEEN STREET

STREET

STREET

GEDDES STREET

STREET

STREET

STREET

STREET

ALLAN STREET

CECILIA

MINTO

ANN

CLARKE

ELORA

WILLIAM

BROWN

JOHN STREET

O-4

S-3

O-8

NELSON STREET

O-1

O-2

O-3

O-7

S-4

S-5

BRANCH OF RED RIVER

MAIN STREET

ROTARY CLUB SWIMMING POOL

OF-1

S-1

S-2

C.H.BIEMAN CREAMERY AND CHEESE PLANT (CREAMERY SECTION)

TEESWATER DAIRY CHEESE AND POWDERED MILK

O-6

FIELD TILE

RED RIVER

Out. Envir. Water treat

LEGEND

STORM SEWER OR PRIVATE DRAIN

OPEN DITCH

(S-2) SAMPLING POINT

O-6 OUTFALL

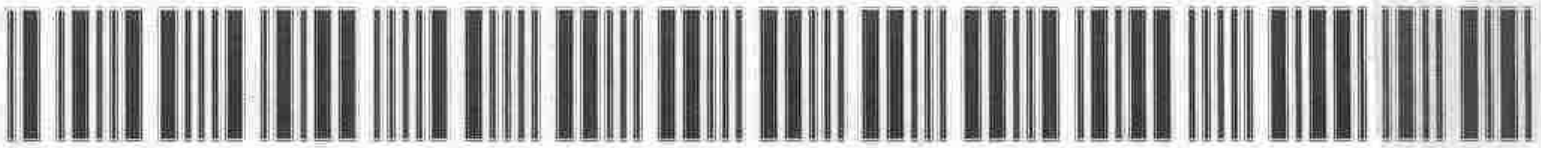
OF-1 OVERFLOW

VILLAGE OF CLIFFORD

WATER POLLUTION SURVEY

SCALE: 1 INCH = 6 CHS

O.W.R.C. JULY 1958 BY H.E.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